



06/08/00

UTILITY PATENT APPLICATION TRANSMITTAL LETTER

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
WN-2164

JC714 U.S. PTO

09/589511



06/08/00

To the Commissioner for Patents:

Transmitted herewith for filing is the patent application of:

Hiroshi AOKI

corresponding to Japanese application 161360/1999, filed June 8, 1999,

entitled: MOBILE RADIO SYSTEM CAPABLE OF CONTROLLING BASE RADIO STATION WITHOUT IMPOSSIBILITY

Enclosed are:

☒ 10 pages of specification.☒ 3 sheets of formal drawings.☒ a newly-executed declaration of the inventor.☐ a copy of an executed declaration of the inventor from prior application Serial No. , filed .☐ incorporation by reference. The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied as indicated in the preceding box, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.☒ an assignment of the invention to NEC Corporation, including assignment cover sheet.☐ Information Disclosure Statement with Form PTO-1449.☐ copies of the Information Disclosure Statement citations.☐ preliminary amendment.☒ return receipt postcard (MPEP 503), specifically itemized.☐ a verified statement to establish small entity status under 37 CFR 1.9 and 1.27.☐ a verified statement to establish small entity status filed in prior application. Status is still proper and desired.☒ a certified copy of the Japanese Priority Document.☒ other: application data sheet.

If a CONTINUING APPLICATION, check appropriate box and supply the requisite information.

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No. , filed .

☒ Customer No. 000466.☒ Correspondence address is: YOUNG & THOMPSON, 745 South 23rd Street, Second Floor, Arlington, Virginia 22202.☒ Telephone: (703) 521-2297. Telefax: (703) 685-0573 or (703) 979-4709.

UTILITY PATENT APPLICATION TRANSMITTAL LETTER

(continued)

Docket No.
WN-2164**CLAIMS AS FILED**

	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE			\$ 690	\$ 690
TOTAL CLAIMS	6 - 20 =	0	X\$ 18	0
INDEPENDENT CLAIMS	1 - 3 =	0	X\$ 78	0
MULTIPLE DEPENDENT CLAIM PRESENT			\$ 260	

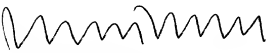
TOTAL \$ 690

If applicant has small entity status under 37
CFR 1.9 and 1.27, then divide total fee by 2,
and enter amount here.

**SMALL ENTITY
TOTAL**

\$

- ☒ A check in the amount of \$730 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 25-0120 in the name of Young & Thompson, as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of \$ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional fee required under 37 CFR 1.16 and 1.17, during the pendency of this application.
- ☐ Charge the issue fee set in 37 CFR 1.18 at the mailing of the Notice of Allowance.


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APPLICATION INFORMATION

Title Line One:: MOBILE RADIO SYSTEM CAPABLE OF
Title Line Two:: CONTROLLING BASE RADIO STATION
Title Line Three:: WITHOUT IMPOSSIBILITY
Total Drawing Sheets:: 3
Formal Drawings?: YES
Application Type:: UTILITY
Docket Number:: WN-2164

REPRESENTATIVE INFORMATION

Representative Customer Number:: 000466

PRIOR FOREIGN APPLICATION

Foreign Application One:: 161360/1999
Filing Date:: JUNE 8, 1999
Country:: JAPAN
Priority Claimed:: YES

MOBILE RADIO SYSTEM CAPABLE OF CONTROLLING
BASE RADIO STATION WITHOUT IMPOSSIBILITY

Background of the Invention:

This invention relates to a mobile radio system, and more particularly, to a link connection procedure in a mobile radio system using an asynchronous transmission mode (ATM) .

In general, a mobile radio system is known which comprises a plurality of radio base stations each of which is connected to a base station control apparatus by an asynchronous transmission mode (ATM) fashion.

In such a system, it is necessary for header information of 24 bits in an ATM cell to have an individual value in each of the radio base stations inasmuch as the header information must be recognized in the base station control apparatus on carrying out transmission and reception between the base station control apparatus and each of the radio base stations. The header information may be representative of an identifier and may be called a VPI/VCI in ATM fashion. When each of the radio base stations starts up in the mobile radio system, the VPI/VCI is not determined in each of the radio base stations. Therefore, it is necessary to individually allocate the VPI/VCI to each of the radio base stations by the base

station control apparatus.

The base station control apparatus manages the VPI/VCI of each radio base station. The VPI/VCI at the time of setting to each radio base station may be different from the VPI/VCI at the subsequent time, by mistake such as a line error, as will be described later.

Inasmuch as the radio base station carries out reception of a message signal in accordance with the VPI/VCI, it is impossible for a specific one of the radio base stations to receive the message signal when the VPI/VCI varies in the specific radio base station. It is impossible to control the specific radio base station by the base station control apparatus. As a result, it is necessary for a person to go to the place where the specific radio base station is installed, in order to reset the specific radio base station.

Summary of the Invention:

It is an object of this invention to provide a mobile radio system capable of preventing control of each of radio base stations from becoming impossible.

Other objects of this invention will become clear as the description proceeds.

On describing the gist of this invention, it is possible to understand that a mobile radio system comprises a base station control apparatus for controlling first through N-th radio base stations each of which is connected to said base station control apparatus, where N represents

a positive integer which is greater than one. The base station control apparatus transmits first through N-th individual identifiers as first through N-th station identifiers to the first through the N-th radio base stations to allocate the first through the N-th individual identifiers to the first through the N-th radio base stations, respectively, on a start-up sequence of each of the first through the N-th radio base stations. The base station control apparatus transmits a transmission message signal having an n-th individual identifier as a transmission individual identifier to an n-th radio base station to carry out a link connection between the base station control apparatus and the n-th radio base station, where n is a variable between one and N, both inclusive.

According to this invention, the n-th radio base station comprises first means for comparing the transmission individual identifier with the n-th station identifier to abandon the transmission message signal when the transmission individual identifier is not coincident with the n-th station identifier and second means for making the first means become a reset state when the first means continues to abandon the transmission message signal during a predetermined time duration.

Brief Description of the Drawings:

Fig. 1 shows a view for describing a link connection of a conventional mobile radio system;

Fig. 2 is a block diagram of a mobile radio system according to a preferred embodiment of this invention; and

Fig. 3 shows a view for describing a link connection in the mobile radio system illustrated in Fig. 2.

Description of the Preferred Embodiment:

Referring to Fig. 1, a link connection of a conventional mobile radio system will be described at first in order to facilitate an understanding of this invention. It will be assumed that a radio base station 11 starts up and that VPI/VCI = "1" should be allocated to the radio base station 11. At this time, it will be assumed that a base station control apparatus 12 allocates VPI/VCI = "2" to the radio base station 11 by mistake such as a line error. More particularly, the base station control apparatus 12 may transmit an allocation signal having VPI/VCI = "2" to the radio base station 11. In the radio base station 11, the allocation signal is received by an ATM cell reception section 11a. Supplied with the allocation signal, a central processing unit (CPU) 11b sets VPI/VCI = "2" in a VPI/VCI filter (not shown).

As readily understood from the above description, the base station control apparatus 12 recognizes that the VPI/VCI of the radio base station A is equal to "1". Therefore, the base station control apparatus 12 makes the VPI/VCI be "1" in order to transmit a message signal to the radio base station 11. Inasmuch as the VPI/VCI filter actually has VPI/VCI = "2", the radio base station 11

abandons the message signal having VPI/VCI = "1" and turns on a light to indicate an error.

When the base station control apparatus 12 again makes the VPI/VCI be "1" in order to transmit the message signal to the radio base station 11, the radio base station 11 abandons the message signal having VPI/VCI = "1" and turns on the light to indicate the error inasmuch as the VPI/VCI filter has VPI/VCI = "2".

As described above, the base station control apparatus manages the VPI/VCI in each of the radio base stations. The VPI/VCI at the time of setting to each radio base station may be different from the VPI/VCI at the subsequent time, by mistake such as the line error.

Inasmuch as the radio base station carries out reception of a message signal in accordance with the VPI/VCI, it is impossible for a specific one of the radio base stations to receive the message signal when the VPI/VCI varies in the specific radio base station. It is impossible to control the specific radio base station by the base station control apparatus. As a result, it is necessary for a person to go to the place where the specific radio base station is installed, in order to reset the specific radio base station.

Referring to Fig. 2, description will proceed to a mobile radio system according to a preferred embodiment of this invention. The mobile radio system comprises first through N-th radio base stations 21-1 to 21-N which are connected to a base station control apparatus 22 by an ATM

fashion, where N is a positive integer which is greater than one. Each of the radio base stations 21-1 to 21- N has first through N -th radio area, respectively. When a mobile station (not shown) is located in a specific one of the first through the N -th radio area, the mobile station communicates with a specific one of the first through the N -th radio base stations that has the specific radio area. In the example being illustrated, each of the first through the N -th radio base stations comprises a central processing unit (CPU) 21a and an ATM data reception section 21b. The base station control apparatus 22 transmits a transmission message signal to each of the first through the N -th radio base stations 21 to 21- N . The transmission message signal comprises a plurality of ATM cells each of which has a transmission VPI/VCI as transmission header information. In each of the first through the N -th radio base stations, the ATM data reception section 21b filters the transmission VPI/VCI of each ATM cell to receive the ATM cell. More particularly, the ATM data reception section 21b receives the ATM cell to transfer the ATM cell to the CPU 21a when the transmission VPI/VCI of the ATM is coincident with an individual VPI/VCI. On the other hand, the ATM data reception section 21b abandons the ATM cell when the transmission VPI/VCI of the ATM is not coincident with the individual VPI/VCI.

Referring to Fig. 3 in addition to Fig. 2, it will be assumed that an n -th radio base station 21- n starts up in accordance with a start-up sequence, where n is a

variable between 1 and N, both inclusive. The individual VPI/VCI has not been set in the n-th radio base station 21-n yet. It will be assumed that the base station control apparatus 22 should allocate VPI/VCI = "1" to the n-th radio base station 21-n. At this time, it will be assumed that the base station control apparatus 22 allocates VPI/VCI = "2" to the n-th radio base station 21-n by mistake such as a line error. More particularly, the base station control apparatus 22 may transmit an allocation signal having VPI/VCI = "2" to the n-th radio base station 21-n by mistake such as a line error. In the n-th radio base station 21-n, the allocation signal is received by the ATM cell reception section 21b. Supplied with the allocation signal, the CPU 21a sets VPI/VCI = "2" in a VPI/VCI filter (not shown).

As readily understood from the above description, the base station control apparatus 22 recognizes that the individual VPI/VCI of the n-th radio base station 21-n is equal to "1". Therefore, the base station control apparatus 22 makes the transmission VPI/VCI be "1" in order to transmit the transmission message signal to the n-th radio base station 21-n. Inasmuch as the VPI/VCI filter actually has VPI/VCI = "2", the n-th radio base station 21-n abandons the message signal having VPI/VCI = "1" and indicates an error inasmuch as the VPI/VCI filter has the individual VPI/VCI = "2". More particularly, the CPU 21a detects the error when the ATM cell reception section 21b indicates the error.

When the base station control apparatus 22 again makes the transmission VPI/VCI be "1" in order to transmit the transmission message signal to the n-th radio base station 21-n, the radio base station 11 abandons the transmission message signal having VPI/VCI = "1" and indicates an error inasmuch as the VPI/VCI filter has the individual VPI/VCI = "2". More particularly, the CPU 21a detects the error when the ATM cell reception section 21b indicates the error.

As described above, the ATM cell reception section 21b becomes an error state when the transmission VPI/VCI is not coincident with the individual VPI/VCI. When the error state continues during a predetermined time duration, the CPU 21a resets the ATM data reception section 21b to make the VPI/VCI filter become "no-set". More particularly, the predetermined time duration lapses after the ATM cell reception section 21b becomes the error state.

After the CPU 21a resets the ATM data reception section 21b, the base station control apparatus 22 again transmit an allocation signal having VPI/VCI = "1" to the n-th radio base station 21-n without a mistake such as a line error. In the n-th radio base station 21-n, the allocation signal is received by the ATM cell reception section 21b. Supplied with the allocation signal, the CPU 21a sets VPI/VCI = "1" in the VPI/VCI filter.

As readily understood from the above description, the base station control apparatus 22 recognizes that the individual VPI/VCI of the n-th radio base station 21-n is

equal to "1". Therefore, the base station control apparatus 22 makes the transmission VPI/VCI be "1" in order to transmit the transmission message signal to the n-th radio base station 21-n. Inasmuch as the VPI/VCI filter actually has VPI/VCI = "1", the ATM data reception section 21b receives the transmission message signal having VPI/VCI = "1" in the n-th radio base station 21-n. After the ATM data reception section 21b receives the transmission message signal having VPI/VCI = "1" in the n-th radio base station 21-n, the ATM data reception section 21b informs the CPU 21a of a reception of the transmission message signal.

As described above, each of the radio base stations carries out a reset to wait for allocation of the individual VPI/VCI in case where the error state continues during the predetermined time duration in the start-up sequence of radio base station. Therefore, it is unnecessary for a person to go to a place where an error radio base station is installed, in order to reset the error radio base station, even if the transmission VPI/VCI is not coincident with the individual VPI/VCI by mistake such as a line error.

The CPU 21a monitors the ATM cell reception section 21b to detect the error state of the ATM cell reception section 21b. When the error state continues in the ATM cell reception section 21b during the predetermined time duration, the CPU 21a judges that the transmission VPI/VCI is not coincident with the individual VPI/VCI. The CPU 21a

resets the ATM cell reception section 21b. Therefore, it is possible to easily prevent control of each radio base station from becoming impossible. It is unnecessary for a person to go to a place where an error radio base station is installed, in order to reset the error radio base station

While this invention has thus far been described in conjunction with the preferred embodiment thereof, it will readily be possible for those skilled in the art to put this invention into practice in various other manners.

WHAT IS CLAIMED IS:

1. A mobile radio system comprising a base station control apparatus for controlling first through N-th radio base stations each of which is connected to said base station control apparatus, where N represents a positive integer which is greater than one, said base station control apparatus transmitting first through N-th individual identifiers as first through N-th station identifiers to said first through said N-th radio base stations to allocate said first through said N-th individual identifiers to said first through said N-th radio base stations, respectively, on a start-up sequence of each of said first through said N-th radio base stations, said base station control apparatus transmitting a transmission message signal having an n-th individual identifier as a transmission individual identifier to an n-th radio base station to carry out a link connection between said base station control apparatus and said n-th radio base station, where n is a variable between one and N, both inclusive, wherein said n-th radio base stations comprises:

first means for comparing said transmission individual identifier with said n-th station identifier to abandon said transmission message signal when said transmission individual identifier is not coincident with said n-th station identifier; and

second means for making said first means become a reset state when said first means continues to abandon said transmission message signal during a predetermined time duration.

2. A mobile radio system as claimed in Claim 1, wherein the base station control apparatus is connected to each of said first through said N-th radio base stations by an ATM fashion.

3. A mobile radio system as claimed in Claim 2, wherein said transmission individual identifier is transmitted in VPI/VCI of an ATM cell from said base station control apparatus to said n-th radio base station.

4. A mobile radio system as claimed in Claim 3, wherein said base station control apparatus again carries out said start-up sequence of said n-th radio base station when said second means makes said first means become said reset state in said n-th radio base station.

5. A mobile radio system as claimed in Claim 3, wherein the first means produces an error to indicate said error when said transmission individual identifier is not coincident with said n-th station identifier.

6. A mobile radio system as claimed in Claim 3, wherein said first means comprises a VPI/VCI filter for filtering said transmission message signal to obtain said transmission individual identifier from said transmission message signal, said VPI/VCI filter judging whether or not said transmission individual identifier is coincident with said n-th station identifier.

Abstract of the Disclosure:

A mobile radio system comprises first through N-th radio base stations, where N represents a positive integer which is greater than one. On a start-up sequence of an n-th radio base station, a base station control apparatus transmits an n-th individual identifier as a station identifier to the n-th radio base station to allocate the n-th individual identifier to the n-th radio base station, where n is a variable between one and N, both inclusive. The base station control apparatus transmits a transmission message signal having the n-th individual identifier as a transmission individual identifier to the n-th radio base station to carry out a link connection between the base station control apparatus and the n-th radio base station. In the n-th radio base station, an ATM reception section compares the transmission individual identifier with the n-th station identifier to abandon the transmission message signal when the transmission individual identifier is not coincident with the n-th station identifier. A CPU makes the ATM reception section become a reset state when the ATM reception section continues to abandon the message signal during a predetermined time duration.

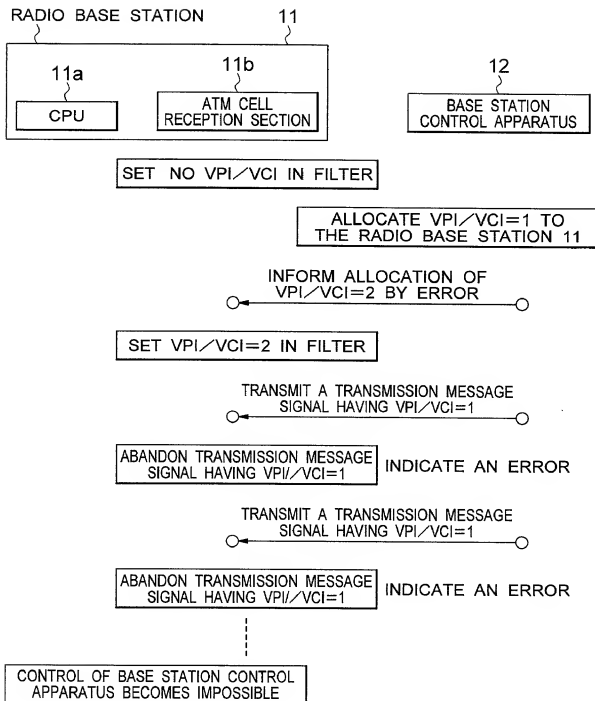


FIG. 1
PRIOR ART

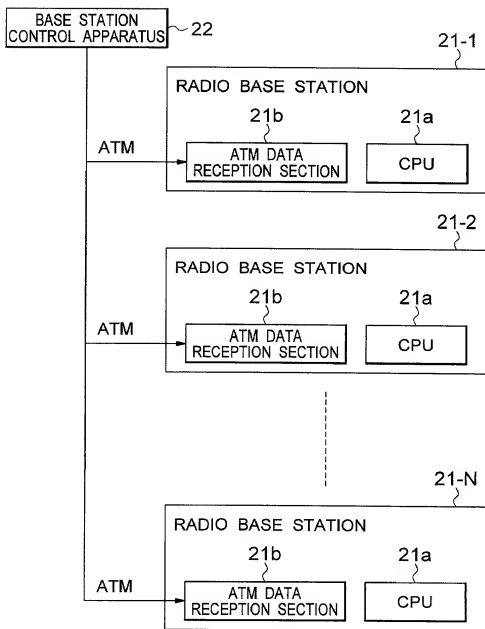


FIG. 2

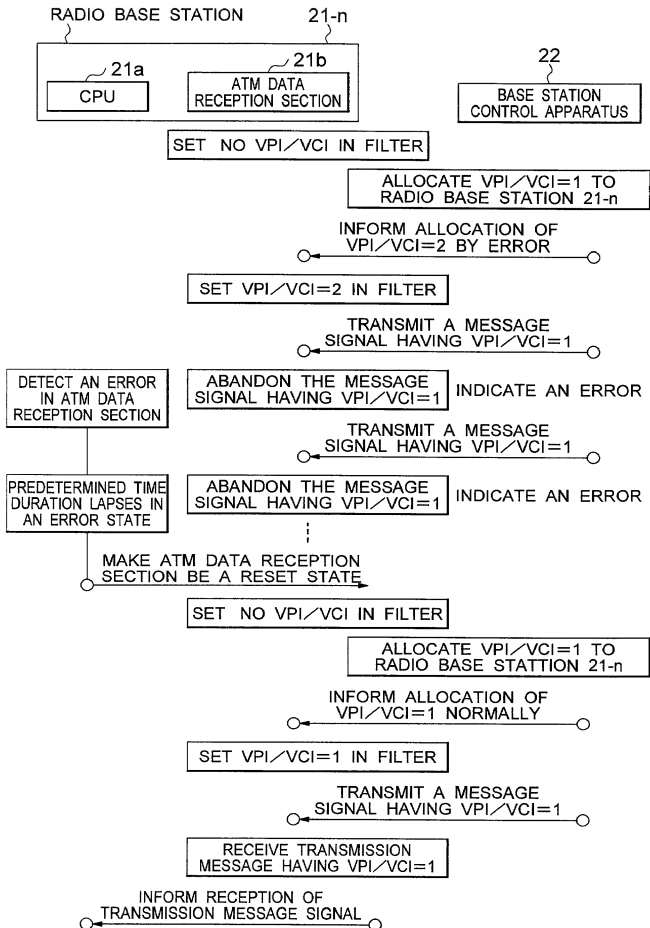


FIG. 3

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MOBILE RADIO SYSTEM CAPABLE OF CONTROLLING BASE RADIO STATION
WITHOUT IMPOSSIBILITY

the specification of which: *(check one)*

REGULAR OR DESIGN APPLICATION

- ☒ is attached hereto.
- ☐ was filed on _____ as application Serial No. _____ and was amended on _____ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

- ☐ was described and claimed in International application No. _____ filed on _____ and as amended on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
Japan	161360/1999	8/6/1999	yes

(Complete this part only if this is a continuing application.)

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status--patented, pending, abandoned)

POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from _____ as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: **Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoît CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, and Thomas W. PERKINS, Reg. No. 33,027, c/o YOUNG & THOMPSON, Second Floor, 745 South 23rd Street, Arlington, Virginia 22202.**

Address all telephone calls to Young & Thompson at 703/521-2297.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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(given name, family name)

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Full name of second joint inventor, if any:
(given name, family name)

Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

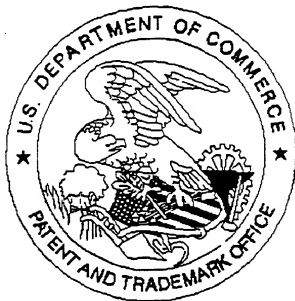
Full name of third joint inventor, if any:
(given name, family name)

Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

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